

WHAT IS CLAIMED IS:

1. A multi-layered fiber reinforced thermoplastic sound absorbing panel comprising:

a porous fiber reinforced thermoplastic core layer comprising a thermoplastic material and from about 20 weight percent to about 80 weight percent fibers, said core layer having a first surface and a second surface;

a tie layer comprising a thermoplastic material, said tie layer covering said second surface of said core layer;

a barrier layer covering said tie layer, said barrier layer comprising a thermoplastic material having a melting temperature higher than the melting temperature of said core layer thermoplastic material, said tie layer bonding said barrier layer to said core layer; and

a fabric layer comprising at least one of a non-woven fabric and a woven fabric bonded to said barrier layer, said fabric layer forming an outer surface of said panel.

2. A multi-layered fiber reinforced thermoplastic panel in accordance with Claim 1 further comprising a decorative layer bonded to said first surface of said core layer.

3. A multi-layered fiber reinforced thermoplastic panel in accordance with Claim 2 wherein said decorative layer comprises a thermoplastic film comprising at least one of polyvinyl chloride, a polyolefin, a thermoplastic polyester, and a thermoplastic elastomer.

4. A multi-layered fiber reinforced thermoplastic panel in accordance with Claim 2 wherein said decorative layer comprises at least one of woven fabric and non-woven fabric comprising at least one of polyvinyl chloride, a polyolefin, a thermoplastic polyester, and a thermoplastic elastomer.

5. A multi-layered fiber reinforced thermoplastic panel in accordance with Claim 2 wherein said decorative layer comprises a bi-layered laminate comprising a foam core and a woven or non-woven fabric, said foam core comprising at least one of polypropylene, polyethylene, polyvinyl chloride, and polyurethane.

6. A multi-layered fiber reinforced thermoplastic panel in accordance with Claim 2 wherein said decorative layer comprises a tri-layered laminate comprising a foam core, a thermoplastic adhesive, and woven or non-woven fabric, said foam core comprising at least one of polypropylene, polyethylene, polyvinyl chloride, and polyurethane.

7. A multi-layered fiber reinforced thermoplastic panel in accordance with Claim 2 wherein said decorative layer comprises a tri-layered laminate comprising a foam core, a non-woven batting, and woven or non-woven fabric, said foam core comprising at least one of polypropylene, polyethylene, polyvinyl chloride, and polyurethane, said non-woven batting comprising at least one polyester material and polyamide fibers.

8. A multi-layered fiber reinforced thermoplastic panel in accordance with Claim 2 further comprising a thermoplastic adhesive layer positioned between said first surface of said core layer and said decorative layer, said thermoplastic adhesive layer bonding said decorative layer to said core layer.

9. A multi-layered fiber reinforced thermoplastic panel in accordance with Claim 8 wherein said thermoplastic adhesive layer comprises at least one layer of thermoplastic adhesive material.

10. A composite sheet comprising:

a permeable core comprising discontinuous fibers bonded together with a thermoplastic resin, said permeable core having a density from about 0.2 gm/cc to about 1.8 gm/cc, said permeable core including a first surface and a second surface;

a barrier layer covering said second surface of said permeable core; and

a fabric layer comprising at least one of a non-woven fabric and a woven fabric bonded to said barrier layer, said fabric layer forming an outer surface of said composite sheet.

11. A composite sheet in accordance with Claim 10 further comprising a tie layer comprising a thermoplastic material having a melting temperature lower than the melting temperature of said barrier layer, said tie layer covering said second surface of said permeable core, said tie layer bonding said barrier layer to said permeable core.

12. A composite sheet in accordance with Claim 10 further comprising a decorative layer bonded to said first surface of said permeable core.

13. A composite sheet in accordance with Claim 12 wherein said decorative layer comprises a thermoplastic film comprising at least one of polyvinyl chloride, a polyolefin, a thermoplastic polyester, and a thermoplastic elastomer.

14. A composite sheet in accordance with Claim 12 wherein said decorative layer comprises at least one of a woven fabric and a non-woven fabric comprising at least one of polyvinyl chloride, a polyolefin, a thermoplastic polyester, and a thermoplastic elastomer.

15. A composite sheet in accordance with Claim 12 wherein said decorative layer comprises a bi-layered laminate comprising a foam core and a woven or non-woven fabric, said foam core comprising at least one of polypropylene, polyethylene, polyvinyl chloride, and polyurethane.

16. A composite sheet in accordance with Claim 12 wherein said decorative layer comprises a tri-layered laminate comprising a foam core, a thermoplastic adhesive, and woven or non-woven fabric, said foam core comprising at least one of polypropylene, polyethylene, polyvinyl chloride, and polyurethane.

17. A composite sheet in accordance with Claim 12 wherein said decorative layer comprises a tri-layered laminate comprising a foam core, a non-woven batting, and woven or non-woven fabric, said foam core comprising at least one of polypropylene, polyethylene, polyvinyl chloride, and polyurethane, said non-woven batting comprising at least one polyester material and polyamide fibers.

18. A composite sheet in accordance with Claim 12 further comprising a thermoplastic adhesive layer positioned between said first surface of said permeable core and said decorative layer, said thermoplastic adhesive layer bonding said decorative layer to said permeable core.

19. A composite sheet in accordance with Claim 18 wherein said thermoplastic adhesive layer comprises at least one layer of thermoplastic adhesive material.

20. A method of manufacturing a porous fiber-reinforced thermoplastic sheet, said method comprising:

providing a porous fiber-reinforced thermoplastic sheet having a first and a second surface and comprising at least one porous core layer comprising a thermoplastic material and from about 20 weight percent to about 80 weight percent fibers;

bonding a barrier layer to the second surface of the porous fiber-reinforced thermoplastic sheet; and

bonding a fabric layer to the barrier layer.

21. A method in accordance with Claim 20 further comprising bonding a decorative layer to the first surface of the porous fiber-reinforced thermoplastic sheet.

22. A method in accordance with Claim 20 wherein said bonding a barrier layer comprises:

positioning an adhesive tie layer between the barrier layer and second surface of the porous fiber-reinforced thermoplastic sheet; and

laminating the barrier layer and tie layer to the porous fiber-reinforced thermoplastic sheet.

23. A method in accordance with Claim 20 wherein said bonding a barrier layer comprises:

forming a sub-assembly comprising a tie layer, the barrier layer, and the fabric layer; and

laminating the sub-assembly to the second surface of the porous fiber-reinforced thermoplastic sheet.

24. A method in accordance with Claim 21 wherein the decorative layer comprises a foam core and a woven or non-woven fabric, the foam core comprising at least one of polypropylene, polyethylene, polyvinyl chloride, and polyurethane.

25. A method in accordance with Claim 21 wherein the decorative layer comprises a foam core, a thermoplastic adhesive, and woven or non-woven fabric, the foam core comprising at least one of polypropylene, polyethylene, polyvinyl chloride, and polyurethane.

26. A method in accordance with Claim 21 wherein the decorative layer comprises a thermoplastic film comprising at least one of polyvinyl chloride, a polyolefin, a thermoplastic polyester, and a thermoplastic elastomer.

27. A method in accordance with Claim 21 wherein the decorative layer comprises at least one of a woven fabric and a non-woven fabric comprising at least one of polyvinyl chloride, a polyolefin, a thermoplastic polyester, and a thermoplastic elastomer.